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"RED BOOKS" of the
BRITISH FIRE PREVENTION COMMITTEE.—No. 186.
Edited by the Executive.

TESTS
WITH
FIRE EXTINGUISHERS

A SPECIAL SERIES
OF
EXPERIMENTAL TESTS
ON
81 PORTABLE
CHEMICAL FIRE EXTINGUISHERS

Particulars of Experimental Tests
and
Memoranda on the Committee's Standards, etc., for
Portable Chemical Fire Extinguishers

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LONDON, 1914

PUBLISHED AT THE OFFICES OF
THE BRITISH FIRE PREVENTION COMMITTEE
(*Founded 1897—Incorporated 1899*)
8 WATERLOO PLACE, PALL MALL

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Three Shillings and Sixpence

OBJECTS OF THE COMMITTEE.

The main objects of the Committee are:

To direct attention to the urgent need for increased protection of life and property from fire by the adoption of preventive measures.

To use its influence in every direction towards minimizing the possibilities and dangers of fire.

To bring together those scientifically interested in the subject of Fire Prevention.

To arrange periodical meetings for the discussion of practical questions bearing on the same.

To establish a reading-room, library and collections for purposes of research, and for supplying recent and authentic information on the subject of Fire Prevention.

To publish from time to time papers specially prepared for the Committee, together with records, extracts, and translations.

To undertake such independent investigations and tests of materials, methods, and appliances as may be considered advisable.

The Committee's Reports on Tests with Materials, Methods of Construction, or Appliances are intended solely to state bare facts and occurrences, with tables, diagrams, or illustrations, and they are on no account to be read as expressions of opinion, criticisms, or comparisons.

The Committee is not responsible for the views of individual authors as expressed in Papers or Notes, but only for such observations as are formally issued on behalf of the Executive.

Similarly the Committee is not responsible for any translation or any summarized translation or explanation of its Reports in a foreign language, even if issued in conjunction with the official English version.

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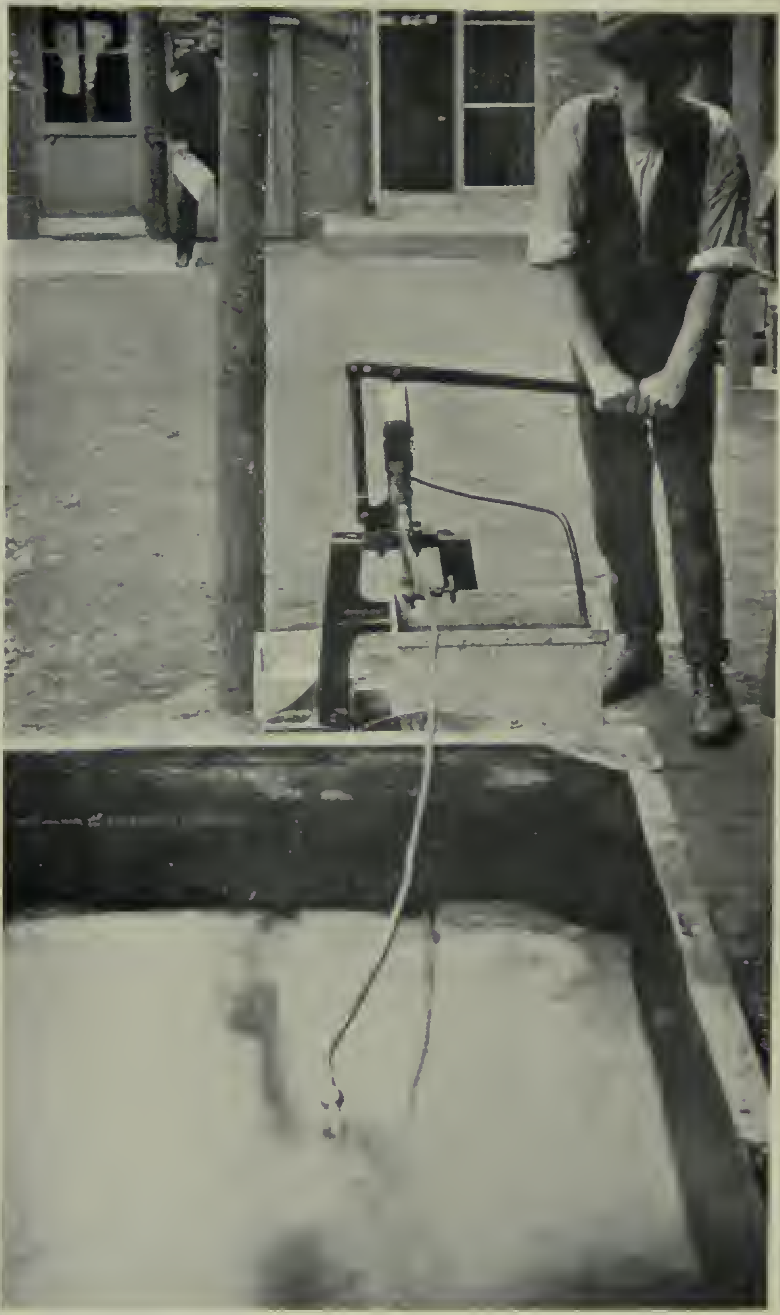

Fig. 1. HYDRAULIC PUMP AND IMMERSION TANK USED FOR THE COMMITTEE'S STANDARD HYDRAULIC TESTS ON PORTABLE CHEMICAL FIRE EXTINGUISHERS.

p. 4.

NOTE.

As indicated in the note prefacing Red Book No. 185, the British Fire Prevention Committee has been recently giving attention to the question of formulating a standard for Portable Chemical Fire Extinguishers from the constructional standpoint. The necessity for such a standard will be the more readily appreciated when it is realized that several fatalities have occurred through these appliances bursting when being operated.—(*See* N.B. *2. at the end of this note.*)

The only collective data available was that obtained during the recent tests the Committee has carried out on Extinguishers which during the past seven years had been submitted for testing in order that their efficiency for fire extinguishing purposes under the Committee's usual standard for Portable Chemical Fire Extinguishers might be ascertained. These recent tests were undertaken primarily to obtain information as to the reliability of these appliances from a constructional standpoint.

As it was felt desirable to supplement these data, the Committee approached a number of its subscribers requesting the loan of Extinguishers which should be drawn promiscuously from the lender's stores.

The Committee desires to place on record its appreciation of the courtesy of those subscribers who readily complied with the request and sent forward a number of Extinguishers, so that an idea of the actual efficiency of such appliances as is generally met with under practical conditions could be obtained. In all, over 80 Extinguishers were loaned to the Committee. Twenty were drawn from Government departments through the kind offices of H.M. Office of Works, six from the London County Council; others from the Port of London Authority, and a railway company, and the remainder from ten other subscribers to the Committee's organization.

Although the Committee purposely avoided having any voice in the selection of the Extinguishers submitted for the additional tests, the majority were of British make. Appliances of no less than 18 makers with 19 types were under review. The sizes varied considerably, from 1¼ to 8½ gallons (*5·6 to 38·2 litres*) and the age from 1 to 40 years.

In the case of Extinguishers which had already been submitted to fire tests by the Committee, there were machines of 9 makers and 10 types under review, of which about one-third were of British manufacture, the remainder being foreign.

Unfortunately, two or three well-known makes have not been tested, but almost all the existing types of construction have, so that those that have been tested practically embrace the whole range of appliances on the British market to-day.

The deductions from this comprehensive series of tests comprise:

(1) The confirmation of the supplementary constructional test for Portable Chemical Fire Extinguishers which the Committee recently issued (*see* Memorandum I).
(2) A specification for Standard Portable Chemical Fire Extinguishers (*see* Memorandum II).
(3) A note of the lessons to be learnt from this series of tests (*see* Memorandum III).
(4) Recommendations as to the maintenance and handling of Portable Chemical Fire Extinguishers (*see* Memorandum IV).

This Committee has been in recent correspondence with various Government departments as to the advisability of arriving at certain standard requirements for Extinguishers purchased by Government departments or specified by them, and it is satisfactory to record that one of the departments has taken the initiative by convening an informal conference between several of the Government offices concerned and institutions such as this Committee, for the purpose of determining some standard specification for the Extinguishers which it requires to be kept under its supervision. For any such conferences the data obtained by this Committee should be of value.

In conclusion, the British Fire Prevention Committee wish to indicate that whilst this investigation of Portable Chemical Fire Extinguishers meets a public requirement, persons using Extinguishers should see that they all conform to the standards and specifications adopted by this Committee and keep constantly in mind that such appliances require care in maintenance and handling; and, further, that they are nothing more than " first aid " appliances. In addition, it should be remembered that Portable Chemical Fire Extinguishers are not the only form of portable "first aid" appliances, but that buckets and hand pumps are equally, if not more, effective in the majority of cases.

For the Executive:

EDWIN O. SACHS,
Chairman.

ELLIS MARSLAND,
Gen. Hon. Secretary.

The Offices of
The British Fire Prevention Committee,
8 Waterloo Place, Pall Mall,
London, S.W.

5th November, 1913.

N.B.1. This Red Book should be read in conjunction with Red Book No. 185 referred to above.

N.B.2. So far as can be ascertained, no record has been kept of accidents—fatal and otherwise—due to the bursting of Portable Chemical Fire Extinguishers.

The following cases, however, are known to have occurred. These must not, of course, be taken in any way as forming a complete list.

Fatal:

1902—April.	On board ship.
1906—October 22.	Portsmouth Dockyard.
1908—August 15.	Bayswater.
1910—February 11.	Pendlebury.
1911—December 4.	Newton Heath.

Injuries:

1902—April.	On board ship.
1905—February 3.	Cuckfield.
1910—July 11.	Wombwell.
1911—June 3.	York.
1911— —	Oulton Broad.
1912—March 18.	Herne Hill.
1912—June.	Darlington.
1912—July 26.	Romford.

MEMORANDUM I.

STANDARD TEST

FOR

PORTABLE CHEMICAL FIRE EXTINGUISHERS.

SUPPLEMENTARY CONSTRUCTIONAL TEST.

Extinguishers to be tested by Hydraulic Pressure to 350 lbs. per sq. in. (*23·8 atmos.*) for 5 minutes.

Note.—This Standard Test is in addition to the tests which the Committee has been and is using to ascertain the efficiency or otherwise of Portable Fire Extinguishers in dealing with actual fires.

Issued by Order of the Executive:

EDWIN O. SACHS,
Chairman.

ELLIS MARSLAND,
Gen. Hon. Secretary.

The Offices of
The British Fire Prevention Committee,
8 Waterloo Place, Pall Mall,
London, S.W.

July, 1913.

MEMORANDUM II.

SUGGESTED SPECIFICATION FOR STANDARD PORTABLE CHEMICAL FIRE EXTINGUISHERS.

Size to be limited—not to exceed 3 gallons (*13·6 litres*), nor to be under 1 gallon (*4·5 litres*).

Construction to be as follows:

Shell: Cylindrical in form not exceeding 8 in. (*·2m.*) diameter.

Ends: Dished, with riveted lap joint. The radius not to exceed the diameter of the end of the shell.

Material: Copper or steel, well coated with tin on the inside and painted on the outside.

Gauge: 18 B.W.G. (*1·218mm.*).

Seams (side and top and bottom): Soldered, lap-jointed and riveted. Rivets at 1 in. (*·0254m.*) pitch.

Collar with Screw Cap: Brass or gun-metal 1 in. (*·0254m.*) in depth with safety holes. Opening to be 3 in. (*·0762m.*) in diameter. Interrupted threads not allowed.

Outlet: Brass or gun-metal, $\frac{3}{8}$-in. (*·0095m.*) bore with strainer.

Nozzle: Brass or gun-metal not less than $\frac{1}{8}$ in. (*·0031m.*)

Hose: $\frac{3}{8}$ in. bore and sufficiently short to prevent nozzle touching the ground, &c.

Plunger and Handles: Strong and conveniently placed.

Washer: $\frac{1}{8}$-in. rubber or leather.

Valves or Control Cocks: None.

Expansion Chamber to be provided.

Air Space to be 15 per cent. of the volume of the cylinder.

Directions for Use: Maker's or vendor's name-plate, year of manufacture, particulars of test: all placed on the Extinguisher by means of transfers.

Mounting: Provision to be made for connections for testing purposes.

For the Extinguisher Research Sub-Committee:

D. W. WOOD,
Chairman.

8th October, 1913.

MEMORANDUM III.

LESSONS TO BE LEARNT FROM THE BRITISH FIRE PREVENTION COMMITTEE'S TESTS.

1. The *Range* of the discharge of the liquid from the Extinguishers, when operated, does not appear to materially differ apart from the difference due to the variation of the chemical charge and the bore of the nozzle through which the jet is delivered. The age of the charge and the size and shape of the machine are almost immaterial.

The jet of liquid delivered is soon broken up into spray, by the effect of the gas generated, and unless applied on the fire at close quarters, within 10 seconds of operating, would apparently not be very effective.

The diameter of the bore of the nozzles varied considerably, from $\frac{1}{32}$ to $\frac{10}{32}$ of an inch (*·0007m.* to *·007m.*), and it would seem that several of the makers have hardly given this question the consideration it deserves.

2. The *Duration* of the discharge, apart from the size of the Extinguisher and the bore of the nozzle, varies according to the effect of the gasification of the liquid as just mentioned.

3. The amount of *Residue* or liquid remaining in the Extinguisher after it has ceased to deliver at the nozzle opening is also affected by the said gasification, and also by the distance of the internal delivery pipe from the bottom of the liquid in the appliance when it was in operation.

4. The application of the *Committee's Standard Hydraulic Test*, viz., 350 lbs. per sq. in. for 5 minutes showed amongst other things the importance of the test being applied for a prescribed period, confirming the previously determined time of 5 minutes. No less than 8 Extinguishers out of 57 submitted to this test failed to sustain this pressure for the period, although the pressure in these particular cases actually reached the 350 lbs., and a further 10 failed to even reach 350 lbs.

5. The pressure at which the Extinguishers failed would seem to indicate in several instances that the makers had failed to realize the necessity of proportionately increasing the strength of the appliance with the increase in the diameter.

The diameters and capacities of the appliances failing at 300 lbs. and under were:

Diameter *in inches*	10	9¾	7½	9¼	5½	8¾	9¾	10¼	8¾	7½
Capacity *in gallons*	6½	5	1¼	5	2	3½	6½	8½	3	1¼
Failing at *lbs. per sq. in.*	50	150	200	240	250	280	300	300	300	300

The weak places in about one-half of the Extinguishers which failed under the Hydraulic test were either the bottoms or the collar and shoulder of the dome.

It would seem that the fact of soldering name plates, conspicu-

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sion knobs, etc., on to the Extinguishers tends to weaken the shell, as in some of those appliances in which the actual material of the body failed the fracture occurred in the shell by the edge of this plate, etc.

The same feature was in a slight degree also noticeable in those machines which had been welded.

In two or three cases the failure commenced at mere pinholes, probably indicating that the Extinguisher had not been thoroughly coated with lead or other acid-proof material.

6. The "*Working*" *pressure* tests resulted in some most useful data being obtained. It must be remembered that these tests show the pressure obtained by operating the Extinguishers in the ordinary way, *but* with the outlets coupled up to the gauge so that *no* liquid is discharged.

It is most essential that the test should be made under these conditions because, as frequently happens, in practice the delivery nozzles are sealed with dirt, etc., or the valves or cocks have perished, or have jammed, and the test should approach as nearly as possible such conditions.

Experimental tests were also carried out to ascertain the "Working" pressure as above defined with varying chemical charges and also with varying clearances or air spaces.

7. As regards the *chemical charge* several important factors must be borne in mind.

(*a*) The alkali should be of reasonable purity. If bicarbonate of soda is used—as is generally the case—care must be exercised that merely carbonate of soda is not obtained by mistake.

(*b*) The acid should be also of reasonable purity and strength. If sulphuric it is advisable that acid of 1·84 S.G. should be used.

(*c*) Theoretically 1 lb. (*·45 kilos.*) of bicarbonate of soda requires 9·3 oz. (weight) (*·26 kilos.*) of Sulphuric acid to liberate all the gas, but it is not advisable to use so much. The maximum quantity of acid to 1 lb. of bicarbonate of soda should never exceed 6 oz. (weight), smaller quantities down to 3½ oz. (weight) being equally effective. And as ¾ lb. (*·34 kilos.*) of bicarbonate of soda is sufficient for 2 gallons (*9 litres*) of water a charge of 3 oz. (weight) (*·085 kilos.*) of acid is all that is required.

One reason for not using too much acid is that it is most undesirable for any free acid to be discharged from the Extinguisher.

To detect if this be the case, a piece of litmus paper could be held in the stream of liquid when the appliance is being tested experimentally, and if the acid has not been neutralized by the alkali, the paper will turn red.

Salt water should not be used. The salt will tend to rapidly rust the appliance, and it should also be remembered that salt water will not absorb so much CO_2 as fresh water, consequently a higher pressure will be generated in the Extinguisher.

Carbon tetrachloride and other chemicals have also the property of absorbing more or less CO_2 than water and thus affect the efficiency of the appliance.

If cylinders of compressed CO_2 gas are used the valve mechanism requires to be very carefully made, and it is also most important that the quantity of gas contained in the cylinder should be limited to that which will only suffice to expel one charge of liquid at a "working pressure" not exceeding 150 lbs. per square inch.

8. After the Extinguisher has been properly charged the amount of *air space* that should be left in it to allow for expansion of the liquid and the gas generated when the appliance has been operated should be at least 15 per cent of the internal volume. It is important that this air space or clearance should be clearly indicated on the Extinguisher, so that this space may not be in any way encroached upon when the appliance is being charged. This should be accomplished by means of an overflow arrangement.

9. The liquid charge of an Extinguisher should not exceed 3 gallons (*13·63 litres*), as the combined weight of a charge of this quantity and the apparatus is approximately ½ cwt. (56 lbs.) (*25·4 kilos.*). An Extinguisher, to be of any service, should also be of not less than 1 gallon capacity.

Care should be taken to see that these appliances hold the actual quantity stated, and that their capacity is not merely so many reputed gallons, etc. It is also advisable that the maker's number indicating size or style should be such that it will not lead to its being confused with the capacity of the Extinguisher.

10. The use of *taps*, controlling cocks or safety-valves should not be allowed. In several cases the cocks jammed or leaked, whilst the rubber in the diaphragm valves had in other cases perished, and so prevented the Extinguisher from operating.

If for any reason cocks must be fitted, indicators to show whether they are open or shut should be provided.

11. The lack of suitable *directions* for operating the appliances was very manifest. The directions should be concise and clear, and should be put on as transfers.

Similarly suitable directions should be provided for re-charging. In the case of Extinguishers not requiring specially constructed acid bottles, etc., the directions must be explicit in stating the quantities of the chemicals to be employed.

12. The *caps* should have at least 1 in. of thread to screw into the collars, and the thread should not be interrupted on the breech-loading principle. Safety holes should be cut therein, so that when the cap is being unscrewed after the Extinguisher has been operated it will not be blown off by the unused gas, but the gas can gradually escape through these holes.

Lever caps are not to be recommended. In nearly every Extinguisher so fitted the collar had cut through the rubber washer.

Hinged caps should not be allowed.

The diameter of the cap opening may be said to average 2 inches. This is too small and scarcely allows the interior of the Extinguisher to be even seen.

13. *Hose* is practically essential in Extinguishers of the "turn over" type, and it is almost impossible to direct the jet of liquid

on to the seat of some fires from appliances of the other class without the addition of hose.

As Rubber hose deteriorates quickly it is important that if it is used the hose be of best quality, capable of withstanding a hydrostatic pressure of 350 lbs. per sq. in. for 5 minutes, and it should be carefully fitted to prevent its being kinked at the juncture of the hose and the outlet on the Extinguisher. Red lead and other cementing bodies should not be used.

The length must be restricted so that the tip of the nozzle will not reach to the bottom of the appliance if the hose is allowed to hang down.

14. The two principal *types* of Extinguishers of the Alkali-Acid class are those in which:—

(1) The acid is in a hermetically sealed bottle, the acid being liberated through the glass bottle being broken by means of a plunger, or the use of a hammer on a concussion knob.

(2) The acid is in a bottle fitted with a loose stopper (generally of lead), the acid being liberated by the appliance being inverted. These are generally known as the " turn over " or " tip up " Extinguishers.

The special features of appliances coming under heading (1) are:

(*a*) The Extinguisher does not come into operation if accidentally upset and the bottle is not broken thereby.

(*b*) The acid does not creep and set up gradual evolution of gas.

(*c*) The maximum pressure generated, when the appliance is operated, is reached almost instantaneously and consequently if the charge happens to be excessive or the outlets are stopped the Extinguisher may burst.

(*d*) If the glass bottle is not properly designed, it may be broken by the plunger, etc., in such a manner that the acid is not liberated.

(*e*) The quantity of acid in the charge is more likely to be correct, seeing that the bottles are supplied by the makers ready filled and sealed.

and under heading (2):

(*a*) If anything is dropped on the appliance there is no plunger to break the acid bottle, but on the other hand if the Extinguisher is upset it is brought into operation.

(*b*) The acid has a tendency to creep and is also of a hygroscopic nature.

(*c*) The evolution of gas when the Extinguisher is operated is more gradual, and consequently not so liable to burst the appliance.

(*d*) No broken glass to get into the nozzle, etc.

(*e*) Great care must be exercised that the chemical charges are correctly proportioned and measured.

15. Another point to be considered is the use of *anti-freezing* mixtures in the Extinguishers. In the ordinary way such an addition is not required in these appliances when installed in this country, but elsewhere or on board ship this may sometimes be necessary. Care must be exercised, as most of the preventatives used have deleterious effects. Common salt—sodium chloride—

rusts metals with rapidity; calcium chloride attacks solder; and glycerine disintegrates rubber.

16. The provision of some device to indicate whether the appliance has been *tampered* with is desirable.

17. A *guard* to fit over the plunger to prevent its being accidentally driven in should be provided.

18. In Extinguishers in which the acid is in hermetically sealed bottles the provision of an *expansion chamber* above the level of the liquid in the Extinguisher is important, as the creeping alkali solution may crystallize and so close the outlet.

19. Some provision should be made to allow of the extinguisher being easily coupled up to a pressure gauge and plant for *testing* purposes.

20. The *cage* holding the bottle of acid should be removable so that after operation the broken glass can be easily removed from the Extinguisher.

For the Extinguisher Research Sub-Committee:

D. W. WOOD,
Chairman.

The Offices of
The British Fire Prevention Committee,
8 *Waterloo Place, Pall Mall,*
London, S.W.

8*th October,* 1913.

N.B.—Additional information is given in the summary of the results of the tests (see page 16) and Table I (see inset).

MEMORANDUM IV.

RECOMMENDATIONS FOR MAINTENANCE AND HANDLING.

1. Printed directions, brief and clear, for operating and recharging to be posted up near the Extinguisher, in addition to the directions on the apparatus.

2. All Extinguishers to be examined once a year to see that they are full, that the contents have not been disturbed—that is, that the liquid contains alkali in solution and that the acid bottle is properly charged.

Note.—An easy method of ascertaining if the liquid in the appliance is of an alkali nature is to test with a piece of litmus paper which will be changed from its violet colour to blue.

For the Extinguisher Research Sub-Committee:

D. W. WOOD,
Chairman.

8*th October,* 1913.

TABLE I.—"RED BOOK" No. 186 OF THE BRITISH FIRE PREVENTION COMMITTEE.

SUMMARY OF TESTS WITH PORTABLE CHEMICAL FIRE EXTINGUISHERS.

PARTICULARS AND DESCRIPTION OF APPLIANCE.										RANGE TEST.					HYDRAULIC (STANDARD) TEST, i.e. (5 mins. at 350 lb. pressure) (23·8 atmos.).					WORKING PRESSURE TEST (nozzle closed).			REMARKS.	
NO.	AGE	TYPE. See Foot-notes.	HOW LONG CHARGED.	REPUTED CAPACITY.	PERCENTAGE OF AIR SPACE TO TOTAL VOLUME.	DIAMETER.	WEIGHT.		DIAMETER OF NOZZLE.	MINIMUM DISTANCE OF DISCHARGE.	GENERAL AVERAGE DISTANCE OF DISCHARGE.	MAXIMUM DISTANCE OF DISCHARGE.	DURATION.	RESIDUE IN CONTAINER AFTER DISCHARGE.	FAILED		PASSED.		SUBSEQUENT BURSTING PRESSURE.	TIME AT WHICH MAXIMUM PRESSURE GENERATED.	MAXIMUM PRESSURE GENERATED PER SQ. IN.	NORMAL PRESSURE PER SQ. IN.	ABBREVIATIONS: r.t. Range test; h.t. Hydraulic test; w.p.t. Working pressure test.	NO
							EMPTY	FULL							TIME.	PRESSURE PER SQ. IN.	TIME	PRESSURE PER SQ. IN.						
1	7 yrs.	C	21 mths	5 gal. (22·7 l.)	13·0 p.c.	9¾ ins (0·25 m)	27 lb. (12·25 kl.)	78 lb (35·38 kl.)	⅛ in (0·003 m.)	20 ft. (6·10 m)	25 ft. to 30 ft. (7·62 m.) (9·14 m)	30 ft. (9·14 m.)	5 min. 20 sec.	1¼ pt. (0·71 l.)	0 min. 10 sec.	350 lb. (23·8 at.)	—	—	—	—	—	—	Not tested for working pressure	1
2	5 yrs.	C	9 mths.	5 gal. (22·7 l.)	13·0 p.c.	9¾ ins. (0·25 m)	28 lb. (12·70 kl.)	79 lb. (35·83 kl.)	⅛ in (0·003 m.)	—	—	—	—	—	2 min. 15 sec.	350 lb. (23·8 at.)	—	—	—	0 min. 5 sec.	80 lb. (5·44 at.)	80 lb. (5·44 at.)	Not tested for range	2
3	6 yrs.	C	5 mths.	5 gal. (22·7 l.)	13·0 p.c.	9¾ ins. (0·25 m)	30 lb (13·61 kl.)	85 lb (38·56 kl.)	⅛ in. (0·003 m.)	16 ft (4·88 m)	30 ft. to 35 ft. (9·14 m.) (10·67 m.)	38 ft. (11·58 m.)	2 min. 20 sec	¾ pt. (0·43 l.)	0 min. 5 sec.	150 lb. (10·2 at.)	—	—	—	—	—	—	Not tested for working pressure	3
4	N.K.	C	N.K.	5 gal. (22·7 l.)	13·0 p.c.	9¾ ins. (0·25 m)	27 lb. (12·25 kl.)	92 lb. (41·73 kl.)	⅛ in. (0·003 m.)	—	—	—	—	—	—	—	5 min	350 lb. (23·8 at.)	450 lb. (30·6 at.)	0 min. 45 sec	92 lb. (6·26 at.)	92 lb. (6·26 at.)	Not tested for range	4
5	7 yrs.	C	3 mths.	4 gal. (18·2 l.)	5·8 p.c.	9½ ins. (0·24 m.)	18 lb. (8·16 kl.)	59 lb. (26·76 kl.)	3/32 in. (0·002 m)	20 ft. (6·10 m.)	25 ft. to 30 ft. (7·62 m.) (9·14 m.)	30 ft (9·14 m.)	5 min. 20 sec.	¾ pt. (0·43 l.)	—	—	5 min.	350 lb. (23·8 at.)	—	—	—	—	Not tested for working pressure	5
6	4 yrs.	C	8 mths.	4 gal. (18·2 l.)	5·8 p.c.	9½ ins. (0·24 m.)	18 lb. (8·16 kl.)	56 lb. (25·40 kl.)	⅛ in. (0·003 m.)	28 ft (8·53 m)	30 ft. to 35 ft. (9·14 m.) (10·67 m.)	38 ft. (11·58 m.)	1 min. 30 sec.	8 pt. (4·54 l.)	—	—	5 min.	350 lb. (23·8 at.)	400 lb. (27·2 at.)	—	—	—	Not tested for working pressure	6
7	5 yrs.	C	2 mths.	4 gal. (18·2 l.)	5·8 p.c.	9½ ins. (0·24 m.)	18 lb (8·16 kl.)	N.K.	⅛ in. (0·003 m)	—	—	—	—	—	—	—	—	—	—	0 min. 20 sec	110 lb. (7·48 at.)	110 lb. (7·48 at.)	Not tested for range or hydraulic test	7
8	7 yrs.	C	8 mths.	4 gal. (18·2 l.)	N.K.	9½ ins. (0·24 m)	18 lb. (8·16 kl.)	61 lb. (27·67 kl.)	⅛ in. (0·003 m.)	—	—	—	—	—	—	—	5 min	350 lb. (23·8 at.)	470 lb. (32·0 at.)	0 min. 10 sec	100 lb. (6·80 at.)	100 lb. (6·80 at.)	Not tested for range	8
9	1 yr.	C	2 mths.	2 gal. (9·1 l.)	5·8 p.c.	7¾ ins. (0·20 m)	13 lb. (5·90 kl.)	32 lb. (14·52 kl.)	⅛ in. (0·003 m.)	15 ft. (4·57 m.)	20 ft. to 25 ft. (6·10 m.) (7·62 m.)	30 ft. (9·14 m.)	2 min. 35 sec	nil	1 min. 6 sec.	350 lb. (23·8 at.)	—	—	—	—	—	—	Not tested for working pressure	9
10	2 yrs.	C	2 mths.	2 gal. (9·1 l.)	5·8 p.c.	7¾ ins. (0·20 m.)	13 lb. (5·90 kl.)	32 lb. (14·52 kl.)	⅛ in. (0·003 m.)	—	—	—	—	—	—	—	—	—	—	0 min. 5 sec	60 lb. (4·08 at.)	60 lb. (4·08 at.)	Not tested for range or hydraulic test	10
11	2 yrs.	C	12 mths.	2 gal. (9·1 l.)	5·8 p.c.	7¾ ins. (0·20 m.)	13 lb. (5·90 kl.)	32 lb. (14·52 kl.)	⅛ in. (0·003 m.)	20 ft. (6·10 m.)	20 ft. to 25 ft. (6·10 m.) (7·62 m.)	34 ft. (10·36 m.)	1 min. 55 sec.	1 pt. (0·57 l.)	—	—	—	—	—	—	—	—	No h.t., through faulty connection; no w.p.t.	11
12	2 yrs.	C	2 mths.	2 gal. (9·1 l.)	5·8 p.c.	7¾ ins (0·20 m.)	13 lb. (5·90 kl.)	N.K.	⅛ in. (0·003 m.)	—	—	—	—	—	—	—	5 min.	350 lb. (23·8 at.)	520 lb. (35·4 at.)	—	—	—	Not tested for range or working pressure	12
13	8 yrs.	C	16 mths.	7 gal. (31·8 l.)	3·4 p.c.	10 ins (0·26 m)	28 lb (12·70 kl.)	98 lb (44·45 kl.)	⅛ in. (0·003 m.)	10 ft. (3·05 m)	15 ft. (4·57 m.)	25 ft. (7·62 m.)	14 min. 0 sec.	5½ pt (3·12 l.)	—	—	5 min.	350 lb. (23·8 at.)	—	—	—	—	Stream small and ineffective. No working pressure test	13
14	8 yrs.	C	10 mths	7 gal. (31·8 l.)	3·4 p.c.	10 ins. (0·26 m.)	31 lb. (14·06 kl.)	N.K.	⅛ in. (0·003 m.)	15 ft. (4·57 m.)	35 ft. (10·67 m.)	50 ft. (15·24 m.)	3 min. 5 sec	4 pt (2·27 l.)	—	—	—	—	—	0 min 10 sec.	150 lb (10·2 at.)	125 lb (8·50 at.)	Valve failed in Range test; no hydraulic test	14
15	7 yrs.	C	8 mths.	7 gal. (31·8 l.)	3·4 p.c	10 ins (0·26 m.)	31 lb. (14·06 kl.)	103 lb. (46·72 kl.)	3/16 ins. (0·005 m.)	32 ft (9·75 m.)	35 ft. to 40 ft. (10·67 m.) (12·19 m.)	48 ft. (14·63 m.)	0 min. 55 sec.	28 pt. (15·90 l.)	—	—	—	—	—	—	—	—	Valve found defective in r.t., no h.t. or w.p.t.	15
16	7 yrs.	C	8 mths.	7 gal. (31·8 l.)	3·4 p.c.	10 ins. (0·26 m.)	31 lb. (14·06 kl.)	102 lb. (46·27 kl.)	3/16 ins. (0·005 m.)	—	—	—	—	—	—	—	5 min.	350 lb. (23·8 at.)	450 lb. (30·6 at.)	0 min. 25 sec.	60 lb. (4·08 at.)	—	Valve failed in working pressure test; no range test	16
17	7 yrs.	C	16 mths.	6½ gal. (29·5 l.)	3·7 p.c	9¾ ins. (0·25 m)	29 lb. (13·15 kl.)	93 lb. (42·18 kl.)	⅛ in. (0·003 m)	10 ft. (3·05 m.)	25 ft to 30 ft. (7·62 m.) (9·14 m.)	45 ft. (13·72 m)	2 min. 20 sec.	16½ pt. (9·37 l.)	—	—	5 min.	350 lb. (23·8 at.)	—	—	—	—	Not tested for working pressure	17
18	8 yrs.	C	11 mths.	6½ gal. (29·5 l.)	3·7 p.c.	9¾ ins. (0·25 m.)	29 lb. (13·15 kl.)	96 lb. (43·55 kl.)	⅛ in. (0·003 m.)	—	—	—	—	—	—	—	—	—	—	0 min. 10 sec	40 lb. (2·72 at.)	30 lb. (2·04 at.)	Not tested for range or hydraulic test	18
19	8 yrs.	C	22 mths.	6½ gal. (29·5 l.)	3·7 p.c	9¾ ins. (0·25 m)	29 lb. (13·15 kl.)	91 lb. (41·28 kl.)	⅛ in. (0·003 m.)	—	—	—	—	—	0 min. 25 sec.	300 lb. (20·4 at.)	—	—	—	—	—	—	Striking hammer lever broke in range test, no w.p.t.	19
20	8 yrs.	C	28 mths.	5 gal. (22·7 l.)	N.K.	9½ ins. (0·24 m)	27 lb. (12·25 kl.)	N.K.	⅛ in (0·003 m.)	—	—	—	—	—	—	—	—	—	—	—	—	—	Not tested. Held in reserve	20
21	20 yrs.	C	9 mths	8½ gal. (38·6 l.)	4·2 p.c.	10¼ ins (0·26 m.)	32 lb (14·52 kl.)	114 lb. (51·71 kl.)	⅛ in. (0·003 m.)	—	—	—	—	—	—	—	5 min	350 lb. (23·8 at.)	—	—	—	—	Diaphragm valve jammed in range test; no w.p.t	21
22	20 yrs.	C	30 mths.	8½ gal. (38·6 l.)	4·2 p.c.	10¼ ins. (0·26 m.)	32 lb. (14·52 kl.)	116 lb. (52·62 kl.)	3/16 in. (0·005 m.)	—	—	—	—	—	0 min. 40 sec.	300 lb. (20·4 at.)	—	—	—	0 min. 5 sec	155 lb. (10·5 at.)	—	After 5 secs. pressure gradually fell in w.p.t., no r.t.	22
23	20 yrs.	C	30 mths.	6½ gal. (29·5 l.)	3·7 p.c.	10 ins. (0·25 m.)	28 lb (12·70 kl.)	92 lb. (41·73 kl.)	⅛ in. (0·003 m.)	5 ft (1·52 m.)	30 ft to 35 ft. (9·14 m.) (10·67 m.)	40 ft. (12·19 m.)	1 min. 40 sec.	28 pt. (15·90 l.)	—	50 lb. (3·40 at.)	—	—	—	—	—	—	Not tested for working pressure	23
24	20 yrs.	C	30 mths.	6½ gal. (29·5 l.)	3·7 p.c.	10 ins. (0·25 m.)	28 lb (12·70 kl.)	96 lb (43·55 kl.)	⅛ in (0·003 m.)	—	—	—	—	—	1 min. 15 sec.	350 lb. (23·8 at.)	—	—	—	0 min. 10 sec.	105 lb. (7·14 at.)	—	After 10 secs. pressure gradually fell in w.p.t.; no r.t.	24
25	4 mths.	T.O.	4 mths.	2 gal. (9·1 l.)	5·8 p.c.	6 ins. (0·15 m.)	17 lb. (7·71 kl.)	36 lb. (16·33 kl.)	1/16 in. (0·0015 m.)	20 ft (6·10 m.)	25 ft. to 30 ft. (7·62 m.) (9·14 m.)	30 ft. (9·14 m.)	2 min. 15 sec	nil	2 min. 50 sec.	350 lb. (23·8 at.)	—	—	—	—	—	—	Not tested for working pressure	25
26	2 yrs.	T.O.	14 mths.	3 gal. (13·6 l.)	N.K.	7 ins. (0·18 m.)	16 lb. (7·26 kl.)	39 lb (17·69 kl.)	3/32 in. (0·002 m.)	—	—	—	—	—	—	—	5 min.	350 lb. (23·8 at.)	—	1 min. 0 sec.	100 lb. (6·80 at.)	100 lb. (6·80 at.)	Not tested for range	26
27	2 yrs.	T.B.O.	15 mths.	3½ gal. (15·9 l.)	17·6 p.c	8¾ ins. (0·22 m.)	21 lb. (9·53 kl.)	55 lb (24·95 kl.)	3/32 in. (0·002 m.)	20 ft. (6·10 m.)	25 ft. (7·62 m.)	35 ft. (10·67 m.)	4 min. 20 sec.	1 pt. (0·57 l.)	1 min. 10 sec.	300 lb. (20·4 at.)	—	—	—	—	—	—	Not tested for working pressure	27
28	8 yrs.	C	12 mths.	2 gal. (9·1 l.)	N.K.	7¾ ins. (0·20 m.)	15 lb. (6·80 kl.)	36 lb. (16·33 kl.)	3/32 in. (0·002 m.)	—	—	—	—	—	0 min. 25 sec.	280 lb. (19·0 at.)	—	—	—	0 min. 20 sec.	80 lb. (5·44 at.)	80 lb. (5·44 at.)	Not tested for range	28
29	3 yrs.	C	9 mths.	2¼ gal. (10·2 l.)	2·8 p.c.	△8 ins. (0·20 m)	10 lb. (4·54 kl.)	31 lb. (14·06 kl.)	3/32 in. (0·002 m.)	30 ft. (9·14 m.)	30 ft. (9·14 m.)	45 ft. (13·72 m.)	1 min. 0 sec.	⅕ pt. (0·11 l.)	—	—	—	—	—	—	—	—	Leaked at valve during h.t., no w.p.t.	29
30	3 yrs.	C	9 mths.	2¼ gal. (10·2 l.)	2·8 p.c.	△8 ins. (0·20 m)	10 lb. (4·54 kl.)	33 lb (14·97 kl.)	3/32 in. (0·002 m.)	—	—	—	—	—	—	—	5 min	350 lb. (23·8 at.)	—	0 min. 10 sec.	130 lb. (8·8 at.)	—	After 10 secs. the pressure gradually fell in w.p.t; no r.t	30
31	10 yrs.	C	48 mths.	3 gal. (13·6 l.)	4·0 p.c.	7 ins. (0·18 m)	15 lb. (6·80 kl.)	44 lb. (19·96 kl.)	3/32 in. (0·002 m.)	15 ft. (4·57 m.)	25 ft. to 30 ft. (7·62 m.) (9·14 m.)	35 ft. (10·67 m.)	2 min. 5 sec.	¼ pt (0·14 l.)	—	—	5 min.	350 lb. (23·8 at.)	—	—	—	—	Not tested for working pressure	31
32	11 yrs.	C	24 mths.	2 gal. (9·1 l.)	N.K.	7 ins. (0·18 m.)	15 lb. (6·80 kl.)	35 lb. (15·88 kl.)	3/32 in. (0·002 m.)	—	—	—	—	—	—	—	5 min.	350 lb. (23·8 at.)	—	0 min. 15 sec.	200 lb. (13·6 at.)	200 lb. (13·6 at.)	Not tested for range	32
33	N.K.	CO_2	36 mths.	1¼ gal. (5·7 l.)	13·0 p.c.	5½ ins. (0·14 m.)	9 lb. (4·08 kl.)	21 lb. (9·53 kl.)	1/32 in. (0·0007 m.)	—	—	—	—	—	—	250 lb. (17·0 at.)	—	—	—	—	—	—	Cock jammed during range test; no working pressure test	33
34	N.K.	C	36 mths.	3½ gal. (15·9 l.)	11·0 p.c.	10 ins. (0·25 m.)	22 lb. (9·98 kl.)	54 lb. (24·49 kl.)	3/32 in. (0·002 m.)	15 ft. (4·57 m.)	20 ft to 25 ft. (6·10 m.) (7·62 m.)	40 ft. (12·19 m.)	4 min. 30 sec.	2 pt. (1·14 l.)	—	—	5 min.	350 lb. (23·8 at.)	—	—	—	—	Not tested for working pressure	34
35	2½ yrs.	C	30 mths.	2¼ gal. (10·2 l.)	2·8 p.c.	△8 ins. (0·20 m.)	10 lb. (4·54 kl.)	29 lb. (13·15 kl.)	3/32 in. (0·002 m.)	5 ft. (1·52 m.)	15 ft. (4·57 m.)	30 ft. (9·14 m.)	2 min. 45 sec.	1¼ pt. (0·71 l.)	—	—	5 min.	350 lb. (23·8 at.)	—	—	—	—	Not tested for working pressure	35
36	2½ yrs.	C	30 mths	2¼ gal. (10·2 l.)	2·8 p.c.	△8 ins. (0·20 m)	10 lb (4·54 kl.)	33 lb. (14·97 kl.)	3/32 in. (0·002 m.)	—	—	—	—	—	—	—	—	—	—	0 min. 15 sec.	135 lb. (9·18 at.)	—	Failed at hydraulic test through leaky washer; no range test	36
37	2½ yrs.	C	30 mths.	2¼ gal. (10·2 l.)	2·8 p.c	△8 ins. (0·20 m.)	10 lb. (4·54 kl.)	32 lb (14·52 kl.)	3/32 in. (0·002 m)	22 ft (6·71 m)	25 ft. to 30 ft. (7·62 m.) (9·14 m.)	36 ft. (10·97 m.)	1 min. 25 sec.	1 pt. (0·57 l.)	—	—	—	—	—	—	—	—	Not tested for hydraulic test or working pressure test	37
38	2½ yrs.	C	30 mths.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Not tested. Held in reserve	38
39	2½ yrs.	C	30 mths.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Not tested. Held in reserve	39
40	2½ yrs.	C	30 mths.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Not tested. Held in reserve	40
41	3 yrs.	C	36 mths.	1¼ gal (5·7 l.)	9·0 p.c	△7½ ins. (0·19 m.)	7 lb. (3·18 kl.)	20 lb. (9·07 kl.)	1/16 in. (0·0015 m)	25 ft. (7·62 m.)	35 ft. (10·67 m.)	35 ft. (10·67 m.)	1 min. 15 sec.	nil	0 min. 32 sec.	350 lb (23·8 at.)	—	—	—	—	—	—	Not tested for working pressure	41
42	3 yrs.	C	36 mths.	1¼ gal (5·7 l.)	9·0 p.c.	△7½ ins. (0·19 m.)	7 lb. (3·18 kl.)	22 lb. (9·98 kl.)	1/16 in. (0·0015 m.)	—	—	—	—	—	2 min. 2 sec.	350 lb. (23·8 at.)	—	—	—	0 min. 5 sec.	120 lb. (8·16 at.)	120 lb. (8·1 at.)	Not tested for range	42
43	2 yrs.	C	24 mths	2¼ gal. (10·2 l.)	2·8 p.c.	△8 ins. (0·20 m)	10 lb. (4·54 kl.)	31 lb. (14·06 kl.)	3/32 in. (0·002 m.)	25 ft. (7·62 m)	30 ft. (9·14 m.)	45 ft. (13·72 m.)	1 min. 10 sec.	½ pt (0·28 l.)	—	—	5 min.	350 lb. (23·8 at.)	—	—	—	—	Not tested for working pressure	43
44	2 yrs.	C	24 mths.	2¼ gal. (10·2 l.)	2·8 p.c.	△8 ins. (0·20 m.)	10 lb. (4·54 kl.)	33 lb (14·97 kl.)	3/32 in. (0·002 m.)	—	—	—	—	—	—	—	5 min.	350 lb. (23·8 at.)	500 lb. (34·0 at.)	0 min. 10 sec.	120 lb. (8·16 at.)	—	After 10 secs. the pressure gradually fell; and no r.t	44
45	N.K.	C	New	7 gal. (31·8 l.)	N.K.	10 ins. (0·25 m.)	33 lb. (14·97 kl.)	102 lb. (46·27 kl.)	5/32 in. (0·004 m.)	—	—	—	—	—	—	—	5 min.	350 lb. (23·8 at.)	440 lb. (29·9 at.)	0 min. 5 sec.	140 lb. (9·5 at.)	140 lb (9·5 at.)	Not tested for range	45
46	N.K.	C	16 mths.	7 gal. (31·8 l.)	1·75 p.c.	10 ins. (0·25 m.)	31 lb. (14·06 kl.)	101 lb. (45·81 kl.)	3/32 in. (0·002 m.)	15 ft. (4·57 m.)	20 ft. to 25 ft. (6·10 m.) (7·62 m.)	35 ft. (10·67 m.)	4 min. 0 sec.	4½ pt. (2·56 l.)	—	—	5 min.	350 lb. (23·8 at.)	—	—	—	—	Not tested for working pressure	46
47	4 yrs.	C	1 mth	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Not tested. Held in reserve	47
48	4 yrs.	C	3 mths.	1⅞ gal. (8·5 l.)	6·25 p.c.	6 ins. (0·15 m.)	10 lb. (4·54 kl.)	30 lb. (13·61 kl.)	⅛ in. (0·003 m.)	20 ft. (6·10 m.)	25 ft. to 30 ft. (7·62 m.) (9·14 m.)	44 ft. (13·41 m)	1 min. 0 sec.	½ pt. (0·28 l.)	—	—	5 min.	350 lb. (23·8 at.)	680 lb. (46·2 at.)	—	—	—	Not tested for working pressure	48
49	4 yrs.	C	1 mth.	1⅞ gal. (8·5 l.)	6·25 p.c.	6 ins. (0·15 m.)	10 lb. (4·54 kl.)	30 lb. (13·61 kl.)	⅛ in. (0·003 m.)	—	—	—	—	—	—	—	5 min.	350 lb. (23·8 at.)	730 lb. (49·6 at.)	0 min. 20 sec.	148 lb. (10·0 at.)	148 lb. (10·0 at.)	Not tested for range	49
50	4 yrs.	C	1 mth	1⅞ gal. (8·5 l.)	6·25 p.c.	6 ins. (0·15 m.)	10 lb. (4·54 kl.)	28 lb. (12·70 kl.)	⅛ in. (0·003 m.)	20 ft. (6·10 m.)	25 ft. (7·62 m.)	30 ft (9·14 m.)	0 min. 45 sec	½ pt. (0·28 l.)	—	—	5 min.	350 lb. (23·8 at.)	—	—	—	—	Not tested for working pressure	50
51	N.K.	CO_2	N.K.	⅕ gal. (0·9 l.)	N.K.	3⅝ ins. (0·09 m.)	3½ lb. (1·59 kl.)	N.K.	1/16 in (0·0015 m.)	10 ft. (3·05 m.)	10 ft. (3·05 m.)	15 ft. (4·57 m.)	0 min. 30 sec.	nil	—	—	5 min.	350 lb. (23·8 at.)	—	—	—	—	Not tested for working pressure	51
52	N.K.	CO_2	N.K.	⅕ gal. (0·9 l.)	N.K.	3⅝ ins. (0·09 m.)	3½ lb. (1·59 kl.)	N.K.	1/16 in. (0·0015 m.)	—	—	—	—	—	—	—	—	—	—	—	—	—	Working pressure test failed, no range test or hydraulic test	52
53	35 to 40 years	C	10 yrs.	7 gal. (31·8 l.)	8·2 p.c	10½ ins. (0·27 m.)	31 lb. (14·06 kl.)	101 lb. (45·81 kl.)	⅛ in. (0·003 m.)	15 ft. (4·57 m.)	25 ft. (7·62 m)	30 ft. (9·14 m.)	4 min. 20 sec.	6½ pt (3·69 l.)	—	—	5 min.	350 lb. (23·8 at.)	—	—	—	—	Not tested for working pressure	53
54	35 to 40 years	C	10 yrs.	7 gal. (31·8 l.)	N.K.	10½ ins. (0·27 m.)	31 lb. (14·06 kl.)	104 lb. (47·17 kl.)	⅛ in. (0·003 m.)	—	—	—	—	—	—	—	—	—	—	0 min. 20 sec.	103 lb. (7 at.)	100 lb. (6·8 at.)	Failed in hydraulic test through leaky valve; no range test	54
55	20 yrs.	C	10 yrs.	7 gal. (31·8 l.)	2·6 p.c.	10 ins. (0·25 m.)	31 lb. (14·06 kl.)	101 lb. (45·81 kl.)	⅛ in. (0·003 m.)	10 ft. (3·05 m.)	20 ft. to 25 ft. (6·10 m.) (7·62 m.)	25 ft. (7·62 m.)	5 min. 10 sec.	4 pt. (2·27 l.)	—	—	5 min.	350 lb. (23·8 at.)	—	—	—	—	Valve failed in range test, no working pressure test	55
56	20 yrs.	C	10 yrs.	7 gal. (31·8 l.)	2·6 p.c.	10 ins. (0·25 m)	31 lb. (14·06 kl.)	108 lb. (48·99 kl.)	⅛ in (0·003 m.)	—	—	—	—	—	—	—	—	—	—	0 min. 5 sec.	120 lb. (8·16 at.)	120 lb. (8·16 at.)	Not tested for range or hydraulic test	56
57	9 yrs.	C	N.K.	2½ gal. (11·5 l.)	nil	△8¼ ins. (0·21 m.)	9 lb. (4·08 kl.)	32 lb. (14·52 kl.)	3/32 in. (0·002 m.)	—	—	—	—	—	—	—	—	—	—	0 min. 5 sec.	180 lb. (12·2 at.)	160 lb. (10·9 at.)	Not tested for range or hydraulic test	57
58	9 yrs.	C	N.K.	2½ gal (11·5 l.)	nil	△8¼ ins. (0·21 m)	9 lb. (4·08 kl.)	31 lb. (14·06 kl.)	3/32 in. (0·002 m.)	—	—	—	—	—	—	—	5 min.	350 lb. (23·8 at.)	350 lb. (23·8 at.)	—	—	—	Not tested for range or working pressure	58
59	3 yrs.	C	36 mths.	2¼ gal. (10·2 l.)	2·8 p.c.	△8 ins (0·20 m.)	11 lb. (4·99 kl.)	32 lb. (14·52 kl.)	3/32 in. (0·002 m.)	—	—	—	—	—	—	—	5 min.	350 lb. (23·8 at.)	—	—	—	—	Not tested for range or working pressure	59
60	3 yrs.	C	36 mths	2¼ gal. (10·2 l.)	2·8 p.c.	△8 ins. (0·20 m.)	11 lb (4·99 kl.)	33 lb. (14·97 kl.)	3/32 in. (0·002 m.)	—	—	—	—	—	—	—	—	—	—	0 min. 15 sec.	155 lb. (10·5 at.)	—	Hydraulic test failed due to leaky washer; no range test	60
61	N.K.	C	N.K.	2 gal. (9·1 l.)	3·0 p.c.	6¼ ins. (0·16 m.)	8 lb. (3·63 kl.)	28 lb (12·70 kl.)	⅛ in. (0·003 m.)	15 ft. (4·57 m.)	20 ft. to 25 ft. (6·10 m.) (7·62 m.)	25 ft. (7·62 m.)	1 min. 0 sec.	¼ pt. (0·13 l.)	—	—	5 min.	350 lb. (23·8 at.)	—	—	—	—	Not tested for working pressure	61
62	N.K.	C	N.K.	2 gal. (9·1 l.)	3·0 p.c	6¼ ins. (0·16 m)	8 lb. (3·63 kl.)	30 lb (13·61 kl.)	⅛ in. (0·003 m.)	—	—	—	—	—	—	—	—	—	—	0 min. 15 sec.	132 lb. (8·9 at.)	132 lb. (8·9 at.)	Not tested for range or hydraulic test	62
63	N.K.	C	N.K.	2 gal. (9·1 l.)	3·0 p.c.	6¼ ins. (0·16 m.)	8 lb. (3·63 kl.)	29 lb. (13·15 kl.)	⅛ in. (0·003 m.)	24 ft. (7·31 m.)	30 ft. to 35 ft. (9·14 m.) (10·67 m.)	44 ft. (13·41 m.)	0 min. 45 sec.	1¼ pt. (0·71 l.)	—	—	—	—	—	—	—	—	Not tested for hydraulic test or working pressure	63
64	N.K.	C	N.K.	7 gal. (31·8 l.)	3·4 p.c.	10 ins. (0·25 m)	28 lb (12·70 kl.)	103 lb (46·72 kl.)	⅛ in. (0·003 m.)	—	—	—	—	—	—	—	—	—	—	0 min. 10 sec.	150 lb. (10·2 at.)	140 lb. (9·4 at.)	Not tested for range or hydraulic test	64
65	N.K.	C	N.K.	7 gal (31·8 l.)	5·0 p.c	10 ins. (0·25 m)	28 lb. (12·70 kl.)	97 lb. (44·00 kl.)	⅛ in. (0·003 m.)	15 ft. (4·57 m.)	20 ft. (6·10 m.)	25 ft. (7·62 m.)	3 min. 30 sec.	6 pt. (3·41 l.)	—	—	5 min.	350 lb. (23·8 at.)	—	—	—	—	Not tested for working pressure	65
66	N.K.	C	N.K.	7 gal. (31·8 l.)	N.K.	10 ins. (0·25 m.)	28 lb. (12·70 kl.)	100 lb. (45·54 kl.)	⅛ in. (0·003 m)	—	—	—	—	—	—	—	—	—	—	0 min. 5 sec.	120 lb. (8·1 at.)	120 lb. (8·1 at.)	Not tested for range or hydraulic test	66
67	N.K.	C	N.K.	2 gal. (9·1 l.)	N.K.	△8 ins. (0·20 m)	11 lb. (4·99 kl.)	33 lb. (14·97 kl.)	⅛ in. (0·003 m.)	—	—	—	—	—	—	—	—	—	—	0 min. 30 sec.	310 lb. (21·1 at.)	310 lb. (21·1 at.)	Not tested for range or hydraulic test	67
68	N.K.	C	N.K.	2 gal. (9·1 l.)	N.K.	7 ins. (0·18 m.)	15 lb. (6·80 kl.)	33 lb. (14·97 kl.)	⅛ in. (0·003 m.)	—	—	—	—	—	—	—	—	—	—	0 min. 10 sec.	155 lb. (10·5 at.)	155 lb. (10·5 at.)	Not tested for range or hydraulic test	68
69	N.K.	C	N.K.	2 gal (9·1 l.)	N.K.	△8 ins. (0·20 m.)	10 lb. (4·54 kl.)	32 lb. (14·52 kl.)	⅛ in (0·003 m.)	—	—	—	—	—	—	—	—	—	—	0 min. 45 sec.	130 lb. (8·8 at.)	130 lb. (8·8 at.)	Not tested for range or hydraulic test	69
70	N.K.	T.B.O.	N.K.	2½ gal. (11·5 l.)	N.K.	7 ins. (0·18 m.)	20 lb. (9·07 kl.)	47 lb. (21·32 kl.)	⅛ in (0·003 m.)	—	—	—	—	—	—	—	—	—	—	0 min. 15 sec.	190 lb. (12·9 at.)	185 lb. (12·6 at.)	Not tested for range or hydraulic test	70
71	N.K.	C	N.K.	2 gal. (9·1 l.)	N.K.	△8 ins. (0·20 m.)	13 lb. (5·90 kl.)	33 lb. (14·97 kl.)	N.K.	—	—	—	—	—	—	—	—	—	—	0 min. 5 sec.	85 lb. (5·78 at.)	—	After 5 secs. pressure gradually fell in w.p.t.; no r.t. or h.t	71
72	3 yrs	C	N.K.	1¼ gal. (5·7 l.)	9·0 p.c	△7½ ins. (0·19 m)	7 lb. (3·18 kl.)	22 lb. (9·98 kl.)	1/16 in. (0·0015 m.)	—	—	—	—	—	—	—	—	—	—	0 min. 5 sec.	100 lb. (6·8 at.)	100 lb. (6·8 at.)	Not tested for range or hydraulic test	72
73	3 yrs.	T.O.	N.K.	2¼ gal (10·2 l.)	15·0 p.c	7 ins. (0·18 m.)	13 lb. (5·90 kl.)	34 lb. (15·42 kl.)	3/32 in. (0·002 m)	—	—	—	—	—	—	—	5 min.	350 lb. (23·8 at.)	—	—	—	—	Not tested for range or working pressure	73
74	3 yrs.	T.O.	N.K.	2¼ gal. (10·2 l.)	15·0 p.c.	7 ins (0·18 m.)	13 lb. (5·90 kl.)	36 lb. (16·33 kl.)	3/32 in. (0·002 m.)	—	—	—	—	—	—	—	5 min.	350 lb. (23·8 at.)	490 lb. (33·3 at.)	1 min. 0 sec.	90 lb. (6·12 at.)	—	After 1 min. pressure gradually rose in w.p.t.; no r.t.	74
75	3 yrs.	T.B.O.	N.K.	2½ gal (11·5 l.)	16·0 p.c.	7 ins. (0·18 m.)	19 lb. (8·62 kl.)	40 lb. (18·14 kl.)	⅛ in. (0·003 m.)	20 ft. (6·10 m.)	25 ft. (7·62 m.)	30 ft. (9·14 m)	1 min. 30 sec.	nil	—	—	5 min.	350 lb. (23·8 at.)	—	—	—	—	Not tested for working pressure	75
76	7 yrs.	C	24 mths.	5 gal. (22·7 l.)	13·0 p.c.	9¾ ins. (0·25 m.)	27 lb. (12·25 kl.)	82 lb. (37·19 kl.)	5/32 in. (0·004 m.)	—	—	—	—	—	—	—	—	—	—	—	—	—	Failed at hydraulic test through faulty connection; no w.p.t	76
77	7 yrs.	C	21 mths.	5 gal. (22·7 l.)	11·0 p.c.	9½ ins. (0·24 m)	27 lb. (12·25 kl.)	76 lb. (34·47 kl.)	5/32 in. (0·004 m.)	25 ft. (7·62 m.)	25 ft. to 30 ft. (7·62 m.) (9·14 m.)	35 ft. (10·67 m.)	2 min. 45 sec.	1 pt. (0·57 l.)	4 min. 20 sec.	350 lb. (23·8 at.)	—	—	—	—	—	—	Not tested for working pressure	77
78	7 yrs.	C	21 mths	5 gal. (22·7 l.)	11·0 p.c.	9¾ ins. (0·25 m)	27 lb. (12·25 kl.)	77 lb (34·93 kl.)	5/32 in. (0·004 m.)	26 ft (7·92 m)	30 ft. to 35 ft. (9·14 m.) (10·67 m.)	38 ft. (11·58 m.)	2 min. 5 sec.	½ pt. (0·28 l.)	—	—	5 min.	350 lb. (23·8 at.)	—	—	—	—	Not tested for working pressure	78
82	N.K.	C	N.K.	5 gal. (22·7 l.)	N.K.	9½ ins. (0·24 m.)	29 lb. (13·15 kl.)	84 lb. (38·10 kl.)	5/32 in (0·004 m.)	6 ft. (1·83 m.)	—	48 ft. (14·62 m.)	2 min. 45 sec.	20 pt. (11·36 l.)	—	240 lb. (16·3 at.)	—	—	—	—	—	—	Range was falling all the time; no working pressure test	82
83	N.K.	C	N.K.	1¼ gal. (5·7 l.)	N.K.	△7½ ins. (0·19 m.)	7 lb. (3·18 kl.)	N.K.	1/16 in. (0·0015 m.)	—	—	—	—	—	—	200 lb. (13·6 at.)	—	—	—	—	—	—	Not tested for range or working pressure	83
84	N.K.	C	N.K.	1¼ gal. (5·7 l.)	N.K.	△7½ ins. (0·19 m)	7 lb. (3·18 kl.)	N.K.	1/16 in. (0·0015 m.)	—	—	—	—	—	0 min. 10 sec.	300 lb. (20·4 at.)	—	—	—	—	—	—	Not tested for range or working pressure	84
121Z	6 yrs.	C	74 mths	2 gal. (9·1 l.)	11·1 p.c.	N.K.	9 lb. (4·08 kl.)	28½ lb. (12·93 kl.)	3/32 in. (0·002 m.)	15 ft. (4·57 m.)	—	25 ft. (7·62 m.)	1 min. 0 sec.	10¼ pt. (5·82 l.)	—	—	5 min.	350 lb. (23·8 at.)	500 lb. (34·0 at.)	—	—	—	Tested wrong side up in range test; no working pressure test	121Z
121Y	6 yrs.	C	74 mths.	2 gal. (9·1 l.)	11·1 p.c.	N.K.	9 lb. (4·08 kl.)	28½ lb. (12·93 kl.)	3/32 in. (0·002 m.)	15 ft. (4·57 m.)	20 ft. (6·10 m.)	30 ft. (9·14 m.)	0 min. 35 sec.	12 pt. (6·80 l.)	—	—	—	—	—	—	—	—	Tested wrong side up in range test; no h.t. or w.p.t.	121Y
124Z	6 yrs.	C	66 mths	3 gal (13·6 l.)	5·8 p.c.	8 ins (0·20 m)	19 lb (8·62 kl)	48 lb. (21·77 kl.)	⅛ in. (0·003 m.)	25 ft. (7·62 m.)	—	30 ft. (9·14 m.)	1 min. 30 sec.	1/10 pt. (0·06 l.)	—	—	5 min.	350 lb. (23·8 at.)	550 lb. (37·4 at.)	—	—	—	Not tested for working pressure	124Z
124Y	6 yrs.	C	66 mths.	3 gal. (13·6 l.)	5·8 p.c	8 ins. (0·20 m.)	19 lb (8·62 kl.)	48 lb. (21·77 kl.)	⅛ in. (0·003 m.)	20 ft. (6·10 m.)	25 ft. to 30 ft. (7·62 m.) (9·14 m.)	45 ft. (13·72 m.)	1 min. 15 sec.	1/10 pt. (0·06 l.)	—	—	—	—	—	—	—	—	Not tested for hydraulic or working pressure	124Y
126Z	5 yrs.	C	61 mths.	1⅝ gal. (7·4 l.)	16·0 p.c	7 ins. (0·18 m.)	17 lb (7·71 kl)	34 lb. (15·42 kl.)	3/32 in. (0·002 m.)	20 ft. (6·10 m.)	—	30 ft. (9·14 m.)	1 min. 30 sec.	⅕ pt. (0·11 l.)	—	—	5 min.	350 lb. (23·8 at.)	570 lb. (38·8 at.)	—	—	—	Not tested for working pressure	126Z
126Y	5 yrs.	C	61 mths.	1⅝ gal. (7·4 l.)	16·0 p.c.	7 ins. (0·18 m.)	17 lb. (7·71 kl.)	34 lb. (15·42 kl)	3/32 in (0·002 m.)	20 ft. (6·10 m.)	25 ft. to 30 ft. (7·62 m) (9·14 m.)	30 ft. (9·14 m.)	1 min. 15 sec.	1/10 pt. (0·06 l.)	—	—	—	—	—	—	—	—	Not tested for hydraulic or working pressure	126Y
134Z	5 yrs.	C	54 mths.	2½ gal. (11·5 l.)	12·19 p.c.	6⅝ ins. (0·17 m.)	13 lb. (5·90 kl)	38 lb (17·24 kl)	3/32 in. (0·002 m.)	15 ft (4·57 m.)	—	30 ft. (9·14 m.)	2 min. 35 sec.	⅗ pt. (0·33 l.)	—	350 lb. (23·8 at.)	—	—	—	—	—	—	Not tested for working pressure	134Z
134Y	5 yrs.	C	54 mths.	2½ gal. (11·5 l.)	12·19 p.c	6⅝ ins. (0·17 m)	13 lb (5·90 kl.)	38 lb. (17·24 kl)	3/32 in. (0·002 m.)	15 ft. (4·57 m)	20 ft. to 25 ft. (6·10 m.) (7·62 m)	30 ft. (9·14 m.)	1 min. 0 sec.	⅕ pt. (0·11 l.)	—	—	—	—	—	—	—	—	Not tested for hydraulic or working pressure	134Y
136Z	5 yrs	CO_2	54 mths	2½ gal. (11·5 l.)	12·19 p.c	9 ins (0·23 m)	17 lb. (7·71 kl)	54 lb. (24·49 kl.)	3/32 in. (0·002 m.)	10 ft. (3·05 m.)	—	30 ft. (9·14 m.)	2 min. 40 sec.	3⅜ pt. (1·92 l.)	—	—	5 min.	350 lb. (23·8 at.)	560 lb. (38·1 at.)	—	—	—	Not tested for working pressure	136Z
142Z	4 yrs.	CO_2	45 mths.	2½ gal (11·5 l.)	14·2 p.c.	7 ins. (0·18 m)	13 lb (5·90 kl)	39 lb. (17·69 kl.)	3/32 in. (0·002 m.)	35 ft. (10·67 m.)	—	45 ft. (13·72 m.)	0 min. 45 sec.	nil	—	—	5 min.	350 lb. (23·8 at.)	560 lb. (38·1 at.)	—	—	—	Not tested for working pressure	142Z
142Y	4 yrs	CO_2	45 mths	2½ gal. (11·5 l.)	14·2 p.c	7 ins. (0·18 m.)	13 lb. (5·90 kl.)	39 lb. (17·69 kl)	3/32 in. (0·002 m.)	25 ft. (7·62 m)	25 ft. to 30 ft. (7·62 m.) (9·14 m.)	35 ft. (10·67 m.)	0 min. 50 sec.	nil	—	—	—	—	—	—	—	—	Not tested for hydraulic or working pressure	142Y
143Z	4 yrs.	T.O.	43 mths	3 gal (13·6 l.)	16·6 p.c.	7¾ ins (0·20 m.)	21 lb (9·53 kl.)	53 lb. (24·04 kl.)	5/16 in. (0·008 m.)	15 ft (4·57 m.)	—	40 ft. (12·19 m.)	0 min. 40 sec.	nil	—	350 lb. (23·8 at.)	—	—	—	—	—	—	Not tested for working pressure	143Z
143Y	4 yrs.	T.O.	43 mths.	3 gal. (13·6 l.)	16·6 p.c	7¾ ins (0·20 m)	21 lb. (9·53 kl.)	53 lb. (24·04 kl.)	5/16 in. (0·008 m)	10 ft. (3·05 m.)	20 ft. to 25 ft. (6·10 m.) (7·62 m)	30 ft. (9·14 m.)	0 min. 45 sec.	4 pt. (2·27 l.)	—	—	—	—	—	—	—	—	Not tested for hydraulic or working pressure	143Y
152Z	3 yrs.	C	38 mths.	2 gal. (9·1 l.)	6·0 p.c.	6 ins. (0·15 m.)	7 lb. (3·18 kl.)	26 lb. (11·79 kl.)	3/32 in. (0·002 m.)	20 ft. (6·10 m.)	—	30 ft. (9·14 m.)	1 min. 0 sec.	nil	—	200 lb. (13·6 at.)	—	—	—	—	—	—	Not tested for working pressure	152Z
165Z	1½ yrs.	CO_2	15 mths.	3¼ gal. (14·8 l.)	5·8 p.c	8¼ ins. (0·21 m)	33 lb. (14·97 kl)	74 lb. (33·57 kl.)	3/32 in. (0·002 m.)	25 ft. (7·62 m)	—	30 ft. (9·14 m.)	1 min. 55 sec.	4/9 pt (0·25 l.)	—	200 lb. (13·6 at.)	—	—	—	—	—	—	Not tested for working pressure	165Z
177Z	7 mths.	T.O.	2 mths	2 gal (9·1 l.)	8·5 p.c.	6⅝ ins. (0·17 m.)	13 lb. (5·90 kl.)	28 lb. (12·70 kl.)	5/16 in. (0·008 m.)	10 ft (3·05 m.)	—	30 ft. (9·14 m.)	0 min. 40 sec.	nil	—	350 lb. (23·8 at.)	—	—	—	—	—	—	Not tested for working pressure	177Z
177Y	7 mths.	T.O.	2 mths	2 gal. (9·1 l.)	8·5 p.c.	6⅝ ins. (0·17 m.)	13 lb. (5·90 kl.)	28 lb. (12·70 kl.)	5/16 in. (0·008 m.)	10 ft. (3·05 m.)	20 ft to 25 ft (6·10 m.) (7·62 m.)	30 ft (9·14 m.)	0 min. 45 sec.	8 pt. (4·54 l.)	—	—	—	—	—	—	—	—	Not tested for hydraulic or working pressure	177Y
184A	New	CO_2	New	2 gal. (9·1 l.)	5·8 p.c	7 ins. (0·18 m)	15 lb. (6·80 kl.)	35 lb (15·88 kl)	3/32 in. (0·002 m.)	—	—	—	—	—	—	—	—	—	—	—	—	—	Failed through leaky washer in hydraulic test; no w.p.t.	184A
184B	New	CO_2	New	2 gal. (9·1 l.)	5·8 p.c.	7 ins (0·18 m.)	N.K.	N.K.	3/32 in. (0·002 m.)	—	—	—	—	—	—	—	—	—	—	1 min. 50 sec.	345 lb.* (23·5 at.)	—	At 110 sec. discontd. w.p.t. as dangerous; no r.t. or h.t.	184B
184C	New	CO_2	New	2 gal. (9·1 l.)	5·8 p.c	7 ins. (0·18 m.)	N.K.	46 lb. (20·87 kl.)	3/32 in. (0·002 m.)	24 ft. (7·31 m.)	25 ft to 30 ft (7·62 m.) (9·14 m.)	32 ft. (9·75 m.)	1 min. 30 sec.	⅕ pt. (0·11 l.)	1 min. 2 sec.	350 lb. (23·8 at.)	—	—	—	—	—	—	Not tested for working pressure	184C

* *Pressure still rising*

NOTES: N.K. = Not Known. C = Concussion or Break Acid Bottle Type. T.O. = Turn Over Type. T.B.O. = Turn Bottle Over Type. CO_2 = Cylinder of Compressed Carbonic Acid Gas Type. △ = Conical shape and diameter of base.

Offices of The British Fire Prevention Committee,
8 Waterloo Place, Pall Mall, London, S.W.
November 5th, 1913.

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D. W. WOOD, *Directing Member.*
For the Testing Arrangements Sub-Committee:
ELLIS MARSLAND *Gen. Hon. Secretary.*

EXPERIMENTAL TESTS

CONDUCTED BY

THE EXECUTIVE

OF THE

British Fire Prevention Committee

[FOUNDED 1897—INCORPORATED 1899.]

TEST No. 186 (Series) JULY 23rd, etc., 1913.

A SPECIAL SERIES

OF

EXPERIMENTAL TESTS

ON

81 PORTABLE CHEMICAL FIRE EXTINGUISHERS.

OBJECT OF TESTS.

(*With particulars of the Tests applied.*)

To ascertain the efficiency—more particularly from a constructional standpoint—of various Portable Chemical Fire Extinguishers in commission, i.e. standing ready for use, which had been loaned to the Committee by H.M. Office of Works, London County Council, and various subscribers, for the express purpose of these Tests.

THE TESTS APPLIED.

The Tests were to ascertain:

1. The range of the jet of liquid discharged from the appliance under the usual working conditions.
2. The length of time the liquid continues to be ejected from the extinguisher.
3. The amount of liquid remaining in the Extinguisher after operation.
4. The result of the application of Hydraulic pressure test of 350 lbs. per square inch (*23·8 atmos.*) for 5 minutes.
5. The Hydraulic pressure at which the appliance failed and the effect of said pressure thereon.

6. The "Working" pressure generated in the Extinguisher when operated in accordance with the maker's "directions for operating," but with the outlet opening coupled to a pressure gauge, and any other openings closely sealed.
7. To ascertain the effect on the "Working" pressure of varying chemical charges.
8. The effect of various air clearance spaces in the apparatus on the "Working" pressures.

SUMMARY OF THE RESULTS OF THE TESTS.

The results of the tests are summarized in Table I appended hereto, and the following may be taken as an analysis thereof:

Range Tests. Some 36 Extinguishers were tested. The extremes of the range of the jet of liquid discharged from the appliances were 5 and 48 feet, 6 delivered the jet for most of the time at from 20 to 25 feet, 8 from 25 to 30 feet, and 5 from 30 to 35 feet. The duration of the jet varied from 45 to 155 seconds with Extinguishers of 2 gallons (approx.) capacity, 125 to 320 seconds with those of 5 gallons, and from 55 to 840 seconds with those of 7 gallons capacity.

Hydraulic Tests. Some 57 Extinguishers were tested:

10 failed at 300 lbs. per sq. in. (*20·7 atmos.*) or under;

8 failed to withstand 350 lbs. per sq. in. (*23·8 atmos.*) for 5 minutes;

33 passed, and of these 10 were further tested to ascertain the pressure at which they failed, the average being 514 lbs. per sq. in. (*35 atmos.*)

Working Pressures Tests. Some 33 Extinguishers were tested, the highest recorded maximum pressure generated was 310 lbs. per sq. in. (*21 atmos.*) and the lowest 40 lbs. (*2·7 atmos.*), whilst the average was 101 lbs. per sq. in. (*6·9 atmos.*).

In addition to the information given above and in the summary Table, attention is particularly drawn to the details set forth in Memorandum III of the Extinguisher Research Sub-Committee.

Note. At the end of the Table have been included some similar data which were obtained when the tests recorded in Red Book No. 185 were undertaken. Three tests from Red Book No. 184 have also been added.

PREPARATIONS FOR AND CONDUCT OF THE TESTS.

The tests were conducted at the Committee's Testing Station, North Bank, Regent's Park, on July 23, 1913. Preparatory tests were carried on on June 23, 1913, and supplementary tests on August 7 and 19, 1913.

The meteorological observations at the Botanic Gardens, Regent's Park, read as follows:

On July 23, 1913, the Barometer at 3 p.m. registered 30·02in. (*762 mm.*). The attached Thermometer 59° F. (*15° C.*). The wind was N.N.W. and the weather overclouded. The day was dull, cold and windy.

All the tests were made and the Portable Fire Extinguishers operated by members of the Sub-Committee or their nominees.

DESCRIPTION OF THE TESTING PLANT.

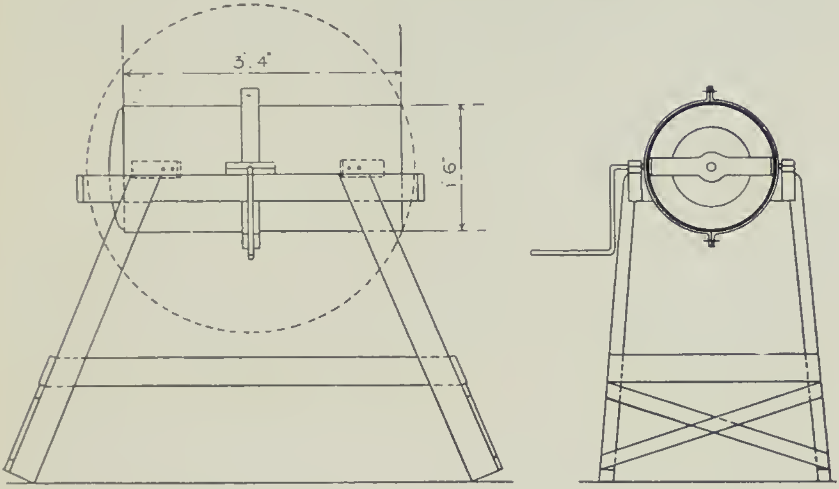
All the Tests were carried out in the open.

Discharging Tests (Range, etc.):

A cylindrical shell (*see Figs.* 2 *and* 4) (from which the Portable Fire Extinguishers were to be operated) was provided as a safeguard in the event of any of the appliances bursting.

Hydraulic Pressure Tests:

An open galvanized iron tank containing water was provided. The tank was of sufficient size to allow the Portable Fire Extinguishers being immersed, and to this was attached a small pump, pressure gauge and connections to the extinguishers.



SIDE ELEVATION END ELEVATION

Fig. 2. PROTECTING SHELL FOR DISCHARGING EXTINGUISHERS.

A larger pump was also kept in reserve in case of emergency.

These tanks and pumps are shown in *Figs.* 1 *and* 3.

" Working Pressure " Tests.

A cylindrical shell—similar to that used for the Discharging Tests—(from which the Portable Fire Extinguishers were to be operated) was provided as a safeguard in the event of any of the appliances bursting. (*See Fig.* 5 on page 19).

CONDUCT AND DETAILS OF THE TESTS.

The Extinguishers were all numbered.

On June 23, 1913, 26 appliances were tested for the Discharge Tests—Range, Duration and Residue.

These Extinguishers were then fitted with uniform connections, and any relief valves, etc., were taken out and properly plugged ready for the Hydraulic tests on July 23, 1913.

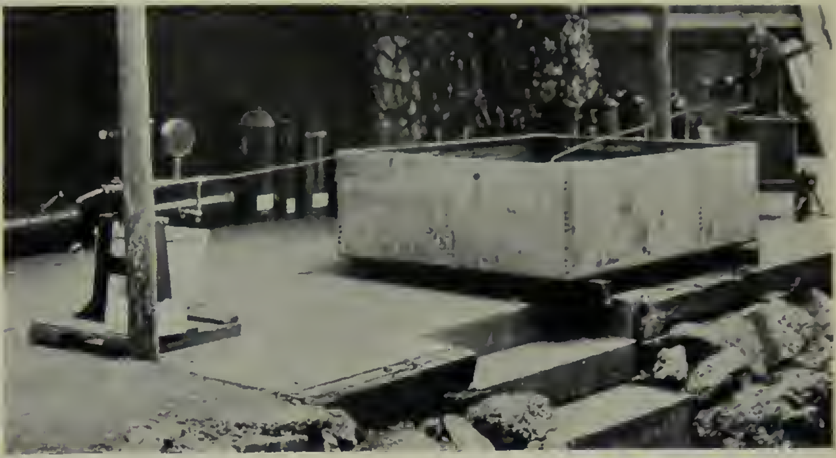


Fig. 3. ARRANGEMENT OF IMMERSION TANK AND TWO PRESSURE PUMPS USED FOR THE COMMITTEE'S HYDRAULIC STANDARD TESTS.

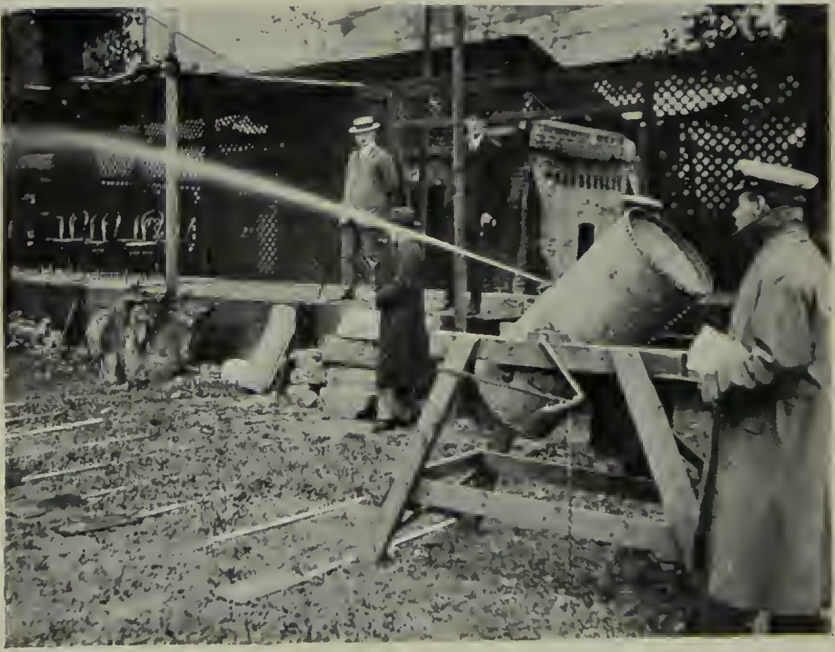


Fig. 4. ARRANGEMENT OF CYLINDER USED FOR THE COMMITTEE'S STANDARD RANGE TESTS.

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On July 23, 1913, each appliance undergoing these Hydraulic tests was also filled with water and separately immersed in a tank of water and connected up to a hydraulic pump fitted with a pressure gauge. A pressure of 350 lbs. per sq. in. (*23·8 atmos.*) was then pumped into the extinguisher and maintained for 5 minutes.

The larger hydraulic pump provided as a reserve was not used.

The temperature of the water in the tank in which the extinguishers were immersed was from 58° to 60° F. (*14·4°* to *15·5° C.*).

On the same day a further set of 10 Extinguishers were tested for the Discharge tests—Range, Duration and Residue.

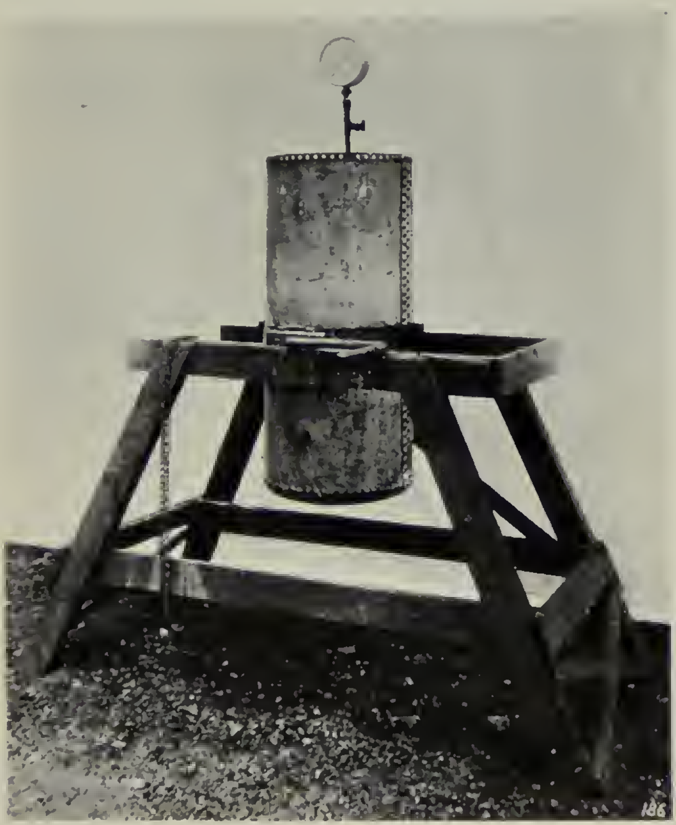

Fig. 5. Arrangement of Cylinder used for the Committee's "Working Pressure" Tests.

The "Working" pressures of an additional 32 Extinguishers were also tested on the same day.

Prior to this test these appliances had all been fitted with uniform connections for the pressure gauge, any relief valves, etc., being taken out and properly plugged. The gauge was screwed on the uniform connection which had been fitted in most cases on to outlet opening on the shell of the extinguisher.

On August 7, 1913, a further 14 appliances were subjected to the standard Hydraulic pressure test. These had been previously fitted as above mentioned.

On the same date some 7 Extinguishers were tested or re-tested for "Working" pressure.

On August 19, 1913, a further 19 Extinguishers were subjected to the Standard Hydraulic pressure test and those that passed were subsequently tested to ascertain the pressure at which they failed.

On the same date some 5 Extinguishers were tested or re-tested for "Working" pressure.

On both August 7 and 19 additional experimental tests were made to ascertain the "Working" pressure under varying conditions.

GENERAL ARRANGEMENTS.

The Tests were carried out in accordance with the procedure laid down by the Executive for investigations of this description, and were conducted by a Sub-Committee comprising:

D. W. Wood (Insurance Surveyor), *Directing Member.*
Thos. R. Brooke, *Deputy Directing Member.*
Ellis Marsland (District Surveyor), *Gen. Hon. Secretary.*
Percy Collins, J.P., F.S.S.
J. Herbert Dyer (Hon. Chief Officer, Alton Fire Brigade).
B. I. Franklin Adams, B.Sc.
F. W. Adams (Chief Officer, Hendon Fire Brigade).
J. W. Brooker (Hon. Chief Officer, Weybridge Fire Brigade).
B. Chatterton, A.M.Inst.C.E. (Insurance Surveyor).
W. Grellier, F.R.I.B.A. (District Surveyor).
R. W. Henderson, J.P., M.D. (Chief Officer, Rickmansworth Fire Brigade).
J. M. Knox (Chief Officer, Nuneaton Fire Brigade).
H. G. Marshallsay (Chief Officer, Aldershot Fire Brigade).
Stanley W. Thorpe (Superintendent, St Albans Fire Brigade).

A. H. Lister (Engineer) assisted the Sub-Committee.

Note: All the members of the Sub-Committee, excepting Stanley W. Thorpe, attended the testing operations of July 23.

The Council was represented for the testing operations of July 23, 1913, by:

The Right Hon. the Earl of Londesborough, K.C.V.O.
Sir James Weeks Szlumper, D.L., J.P., M.Inst.C.E.

The Executive was represented by:

Edwin O. Sachs, F.R.S.Ed., *Chairman.*
Horace S. Folker, F.A.I., *Hon. Treasurer.*

The Committee's Hon. Medical Officer, Major R. J. Maitland-Coffin, F.R.C.P., was in attendance with a sergeant of the St John Ambulance Association.

The police arrangements were under the direction of the Hon. Treasurer and the Committee Rooms in charge of J. W. Brooker and J. M. Knox.

The general body of members was represented for the testing operations of July 23, 1913, by:

Lieut. Sladen, R.N. (Chief Officer, London Fire Brigade).
S. G. Gamble, F.S.I., A.M.Inst.C.E. (Divisional Officer, London Fire Brigade).

The following subscribers and visitors attended by special invitation of the Executive on July 23rd, 1913:

Messrs F. Bradley (Chief Inspector, Metropolitan Police); H. P. Brown (Engineer-in-Chief's Department, General Post Office); W. H. Cluett (British Thompson Houston Co., Ltd.); J. Elliott (Sub-Divisional Inspector, Metropolitan Police); W. A. Fitzgerald (Engineering Division, H.M. Office of Works); E. A. Lakey (Dockyard Department, Admiralty); M. P. McLaren (Engineering Division, H.M. Office of Works); E. L. Monk (Siemens Bros., Ltd.); W. J. O'Donnell (Public Control Department, London County Council); J. Ollis (Chief Officer, Public Control Department, London County Council); F. J. E. Raby (Engineering Division, H.M. Office of Works); J. Renton (Engineer's Department, Trinity House); M. Salmon (Lloyd's Register of British and Foreign Shipping); Henry H. Skipper (Admiralty); A. F. Stokes (Nobel's Explosives Co., Ltd.); H. Wilson (Engineer-in-Chief's Department, General Post Office).

Preliminary and supplementary tests were conducted:

On June 23 by the following members of the Sub-Committee: D. W. Wood and Thos. R. Brooke.

On August 7 by the following members of the Sub-Committee: D. W. Wood; Thos. R. Brooke; Ellis Marsland and Stanley W. Thorpe—Major R. J. Maitland-Coffin being in attendance and Sidney G. Gamble present.

On August 19 by the following members of the Sub-Committee: D. W. Wood, Ellis Marsland, J. Herbert Dyer, W. Grellier and Stanley W. Thorpe—Edwin O. Sachs and Major R. J. Maitland-Coffin being in attendance and Sidney G. Gamble present.

Signed,

For the Sub-Committee conducting the Tests:

D. W. WOOD, *Directing Member.*

For the General Testing Arrangements Sub-Committee:

ELLIS MARSLAND.

For the Executive:

EDWIN O. SACHS.

Published by the Committee as directed by the Executive.

HORACE S. FOLKER
(Hon. Treasurer).

Date—November 5, 1913.

Verified as a true copy of the Report ordered to be published.

SPENCER, GIBSON & SON
(Solicitors).

Date—January 1, 1914.

Lists of the Committee's Publications, etc., are obtainable upon application to the Assistant Secretary, 8 Waterloo Place, Pall Mall, London, S.W.

APPENDIX I.

BRITISH FIRE PREVENTION COMMITTEE

(FOUNDED 1897—INCORPORATED 1899.)

PORTABLE CHEMICAL FIRE EXTINGUISHERS.

FORM OF DETAILS.

1. *RED BOOK NO.*
2. *NAME OF EXTINGUISHER*
3. *Makers' Class No.*
4. *MAKERS*
5. *DATE CHARGED*
6. *TYPE* (i.e. Alkali-Acid, CO_2 Cartridge, Compressed Air, etc.)
7. *METHOD OF OPERATING*
8. *CAPACITY* reputed
9. ,, *gross*
10. ,, when properly filled
11. *RESIDUE* in *liquid ozs.* after test
12. *WEIGHT charged*
13. ,, *empty*
14. *MEASUREMENT height.*
15. ,, *diameter*

DESCRIPTION.

SHELL.

16. Shape
17. Ends
18. Metal
19. Gauge (thickness)
20. Coated inside with
21. Coated outside with
22. Seams—side, kind
23. Spacing of Rivets
24. Seams—end, kind
25. Spacing of Rivets
26. Interior—can it be easily seen for examination
27. Condition
28. Testing—to what pressure has the extinguisher been tested by makers
29. Result of hydraulic pressure of 350 lbs. per square in. for 5 minutes.
30. Expansion volume of vessel
31. If pressure continued beyond 350 lbs. per square in. for 5 minutes what pressure burst the appliance
32. Filling—what overflow arrangement provided to prevent overfilling
33. Air space—amount left for expansion of liquid, &c. (i.e. percentage of total internal volume)

COLLAR.

34. Metal
35. How fixed to shell

CAP.

36. Metal
37. How fixed to collar
38. If screw—number of threads and pitch.

OUTLET—EXTERNAL.

39. Metal
40. Method of attachment
41. Size of bore

OUTLET STRAINER.

42. Metal
43. Coated with
44. Position and description
45. Size of bore

OUTLET—INTERNAL

46. Metal
47. Coated with
48. Position and description

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HOSE.

49. Material
50. Armoured
51. Length
52. Method of attachment
53. Size of bore
54. Pressure test
55. Kinking
56. Condition

NOZZLE.

57. Metal
58. Size of bore
59. Rubber cap
60. Condition—clogged, &c.

PLUNGER.

61. Stuffing box material
62. Packing material
63. Material
64. Spring material
65. Means to prevent accidental operation

HANDLES.

66. Number
67. Position
68. Material
69. Method of attachment

STRAPS.

70. Material
71. Position
72. Use

SAFETY VALVE.

73. Material
74. Control
75. Set at
76. Position
77. Condition

CONTROL COCKS or VALVES.

78. Material
79. Type
80. Position
81. Condition

JOINTS or WASHERS.

82. Position
83. Material
84. Thickness
85. Condition

CHEMICALS.

ALKALI-ACID TYPE.

86. *ACID* used
87. Quantity-weight
88. Specific gravity

Container

89. Material
90. How sealed
91. Stopper-kind
92. Stopper material
93. Capacity
94. Filling line—how marked

CAGE.

95. Material
96. Coated with
97. Strainer
98. Will acid readily spill or shake out
99. *ALKALI* or salt used
100. Quantity—weight
101. Container

CO_2 TYPE.

CARTRIDGE.

102. Material
103. Seal
104. Pressure test
105. Capacity
106. Position
107. How operated

CHEMICALS—OTHERS

108 Full particulars

COMPRESSED AIR.—

109. Full particulars

DIRECTIONS for OPERATING.

110. Position on machine

DIRECTIONS for RE-CHARGING.

111. Position on Machine
112. *RANGE OF HORIZONTAL JET*
113. Duration
114. *RANGE OF VERTICAL JET*

RE-CHARGING.

115. Materials—how supplied
116. New parts required
117. Screws, &c., to be adjusted
118. *ANTI-FREEZING* mixture used—material
119. Quantity
120. *TAMPERING*—any device to indicate.
121. *CORROSION*—brief report.
122. *BURSTING* pressure test—details
123. *DATE* of filling in form.

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